Why costs overrun

Explain the distribution of cost overruns from the way costs are revised.

Behavior and incentives	Flyvbjerg et al. (2009)
Project selection	Eliasson and Fosgerau (2013)
Uncertainty	Love et al. (2016)

This paper adds a model of proportional cost updates.

Cost risk affects approval

+28%

Mean cost overrun
258 transport projects

Flyvbjerg et al. (2002)

Underestimated costs distort project selection and contingency budgets.

Costs add across work packages.
Revisions compound over successive updates.
Shared shocks affect several projects together.

Cost revisions compound

$$R = \frac{C_a}{C_e} = \Pi_{i=1}^{N}(1 + \varepsilon_i)$$

Actual cost / estimated cost; ε_i is revision i.

$$1.12 \times 1.18 \times 1.20 = 1.586$$

Design change, escalation and delay give a 58.6% overrun.

Derive the shape of individual-project risk.
Separate that risk from portfolio dependence.
Connect the distribution to budget quantiles.

Two levels of uncertainty

Within a project

$$\ln R \approx \mathcal{N}(\mu, \sigma^2)$$

Many weakly dependent updates; finite log-variance; no dominant update. Lognormality is a baseline.

$$\mathbb{E}[R] = \text{median}(R)\, e^{\sigma^2/2}$$

Across projects (Proposition 1)

Independent risks diversify in large averages.
A shared Gaussian factor leaves a skewed limit.

The result concerns portfolio averages across realizations.

The tail changes the budget

Illustrative lognormal calibration $\mu = 0.202$, $\sigma = 0.298$

+22%	+28%	+100%
Median	Mean	95th percentile

A budget quantile states the intended coverage probability.

These are model-implied summaries, not a fit test.
Cross-sectional gaps do not identify correlation.

Rich (2026), Section 4.3, based on Flyvbjerg et al. (2002).

Separate shape from bias

Compounding explains a source of skewness.

Behavior, selection and scope changes still matter for the level of overruns.

Shared exposure limits diversification.
Evidence of dependence requires co-movement data.

Report the typical cost, expected cost and budget coverage separately.

Rich (2026), Transportation Research Part A. DOI: 10.1016/j.tra.2026.105189